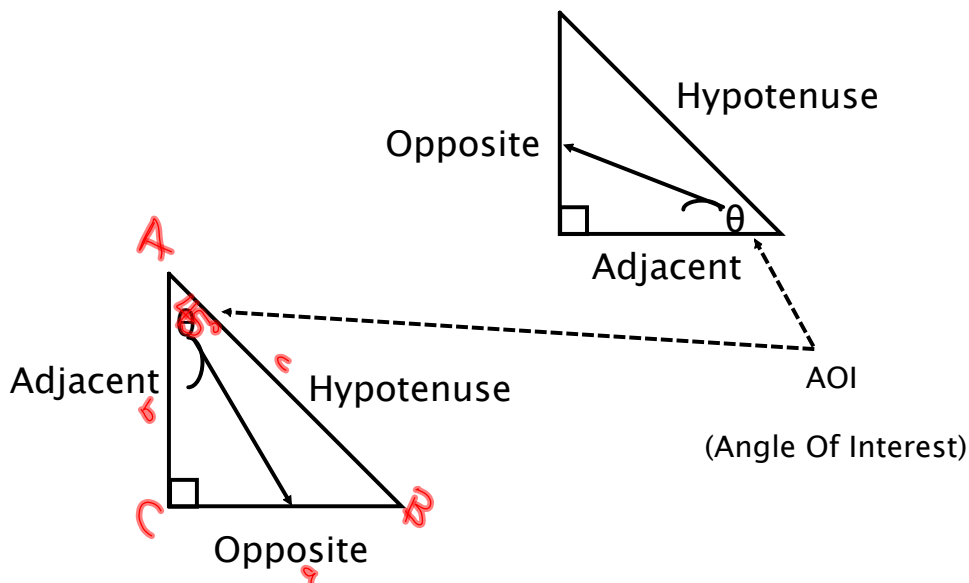


5.3 (7.5) - Solving Right Triangles

Trig: Labelling Sides



Three (3) primary trigonometric ratios.

$$\begin{aligned} \text{sine of } \theta &= \frac{\text{opposite}}{\text{hypotenuse}} && \text{SOH} \\ \text{cosine of } \theta &= \frac{\text{adjacent}}{\text{hypotenuse}} && \text{CAH} \\ \text{tangent of } \theta &= \frac{\text{opposite}}{\text{adjacent}} && \text{TOA} \end{aligned}$$

Use these ratios to solve for a missing side or angle.

$\sin \alpha = \frac{4}{8}$
 $\cos \alpha = \frac{6.92821}{8}$
 $\tan \alpha = \frac{4}{6.92821}$

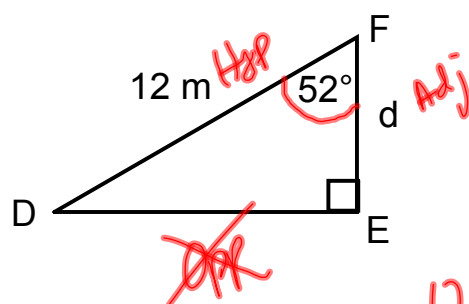
$\sin \theta = \frac{6.92821}{8}$
 $\cos \theta = \frac{4}{8}$
 $\tan \theta = \frac{6.92821}{4}$

SohCahToa
 (Famous Japanese mathematician karate dojo guy!)

L4(7.5) - Solving Right Triangles

Recall: Trigonometric ratios can be used to determine side lengths or angle measures.

Ex.1 Calculate the height of the triangle shown below.



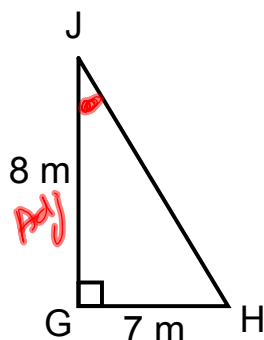
SOH CAH TOA

$$\cos \theta = \frac{A}{H}$$

$$12 \cdot \cos 52^\circ = \frac{d}{12}$$

$$d = 7.39$$

Ex.2 Determine the measure of angle J in the triangle shown below.



Solve CATH TOA

$$\tan \theta = \frac{O}{A}$$

$$\tan \theta = \frac{7}{8}$$

$$\tan^{-1}(\tan \theta) = \tan^{-1}\left(\frac{7}{8}\right)$$

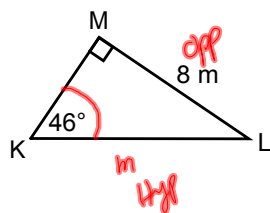
$$\theta = 41^\circ$$

To **solve a triangle** means to find all the missing sides and angles.

Solve CATH TOA

For right triangles use Pythagorean Theorem and/or the primary trigonometric ratios.

Ex.3 Solve the triangle shown below.



$$\angle L = 180^\circ - 90^\circ - 46^\circ$$

$$\angle L = 44^\circ$$

$$\sin 46^\circ = \frac{8}{m}$$

$$8 \cdot \frac{1}{\sin 46^\circ} = \frac{m}{8}$$

$$m = \frac{8}{\sin 46^\circ}$$

$$m = 11.12$$

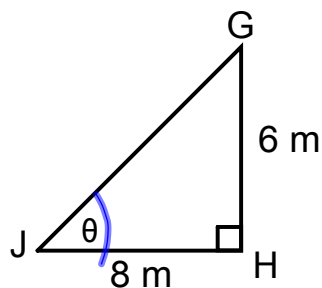
side m is
11.12 metres

$$\sin 46^\circ = \frac{8}{m}$$

$$m = \frac{8}{\sin 46^\circ}$$

$$m = 11.12$$

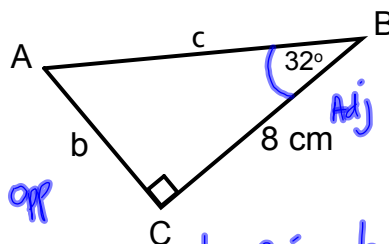
Determine the missing angle or side using the trigonometric ratios. Round your lengths to two decimal places and angles to the nearest degree.



$$\tan \theta = \frac{6}{8}$$

$$\theta = \tan^{-1}\left(\frac{6}{8}\right)$$

$$\theta \approx 37^\circ$$



or

$$8 \cdot \tan 32^\circ = \frac{b}{8} \cdot 8$$

$$b = 8 \tan 32^\circ$$

$$b \approx 5$$

$$c^2 = a^2 + b^2$$

$$c^2 = 5^2 + 8^2$$

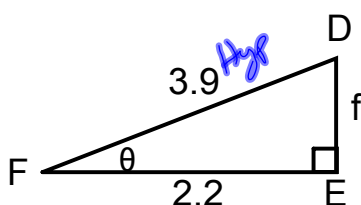
$$c^2 = 25 + 64$$

$$c = \sqrt{89}$$

$$c \approx 9.4$$

Ex.2 Solve the triangle shown below

SOH CAH TOA



Adj

$$\tan 56^\circ = \frac{f}{2.2}$$

$$\cos \theta = \frac{A}{H}$$

$$\cos \theta = \frac{2.2}{3.9}$$

$$\theta = \cos^{-1}\left(\frac{2.2}{3.9}\right)$$

$$\theta \approx 56^\circ$$

p.398 #8a,c,d,e, 9, 10, 11

p.404 #3, 5a, 8a, 10, 12